OCCUPATIONAL SAFETY
AND HEALTH STANDARDS BOARD
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SECOND NOTICE OF PROPOSED MODIFICATIONS TO CALIFORNIA CODE OF REGULATIONS

TITLE 8: Chapter 4, Subchapter 4, Article 29, Section 1712 of the Construction Safety Orders

Hazards Associated with Reinforcing Steel and Other Similar Projections

Pursuant to Government Code Section 11346.8(c), the Occupational Safety and Health Standards Board (Standards Board) gives notice of the opportunity to submit written comments on the above-named regulations in which further modifications are being considered as a result of public comments and/or Board staff evaluation.

On September 22, 2003, the Standards Board mailed a Notice of Proposed Modifications to interested parties and Board members to consider revisions to Title 8, Section 1712 of the Construction Safety Orders, California Code of Regulations. The Standards Board received two written comments on the proposed revisions. The regulations have been further modified as a result of the comments and Board consideration.

A copy of the modified text and subsequent modifications clearly indicated are attached for your information. In addition, a summary of the written comments regarding the Notice of Proposed Modifications and staff responses are included.

Any written comments on these modifications must be received by 5:00 p.m. on November 10, 2003 at the Occupational Safety and Health Standards Board, 2520 Venture Oaks Way, Suite 350, Sacramento, California 95833. These regulations will be scheduled for adoption at a future business meeting of the Standards Board.

Pursuant to Government Code Section 11346.8(d), notice is also given of the opportunity to submit comments concerning the addition to the rulemaking file of the following material relied upon:

- Rebar Drop Test (CD), J.L. Davidson Co. Inc., dated October 9, 2003.

A copy of this CD and the Standards Board's rulemaking files on the proposed action are open to public inspection Monday through Friday, from 8:00 a.m. to 4:30 p.m., at the Standards Board's office at 2520 Venture Oaks Way, Suite 350, Sacramento, California 95833.

Inquiries concerning the proposed changes may be directed to the Executive Officer, Keith Umemoto at (916) 274-5721.

OCCUPATIONAL SAFETY AND HEALTH
STANDARDS BOARD

Date: October 24, 2003

_____
Keith Umemoto, Executive Officer

PROPOSED MODIFICATIONS FOR 1st 15-DAY NOTICE
(Modifications are indicated by bold, double-underlined for new language and bold, strikeout for deleted language.)

STANDARDS PRESENTATION
TO
CALIFORNIA OCCUPATIONAL SAFETY AND HEALTH STANDARDS BOARD

PROPOSED STATE STANDARD,
TITLE 8, CHAPTER 4

Amend Section 1712 to read as follows:

§1712. ~~Hazards Associated with the Use of~~ Reinforcing Steel and Other Similar Projections.

(a) Scope. This section applies to all work sites and locations where employees work around or over exposed, projecting, reinforcing steel or other similar projections.

(b) Definitions.

~~Caps. Manufactured devices that completely cover exposed ends of reinforcing steel and have flat or mushroomed surface at least twice the diameter of the reinforcing steel they are designed to cover.~~

Hooking. Vertical reinforcing steel bent over to an angle of 90 degrees or more, sufficient to prevent impalement.

Job-Built. As used in this section, protective covers and troughs usually constructed at the job-site of wood or other ~~similar~~ materials **of equal or greater strength** and designed specifically for covering exposed ends of reinforcing steel or other similar projections at a specific job-site.

Protective Covers. Manufactured or job-built apparatus designed to cover exposed ends of reinforcing steel or other similar projections so as to prevent impalement.

Troughs. Manufactured or job-built protective covers designed to cover **two or more** exposed ends of reinforcing steel or other similar projections so as to prevent impalement**, and which meet the applicable requirements in subsection (d)**. ~~**Troughs are long narrow open receptacles, usually boxlike in shape. See Appendix Plate C-25 for an example of a job-built trough.**~~

(c) Protection from Reinforcing Steel and Other Similar Projections.

(1) Employees working at grade or at the same surface as exposed protruding reinforcing steel or other similar projections, shall be protected against the hazard of impalement by guarding ~~**the**~~ **all** exposed ends **that extend up to 6 feet above grade or other work surface,** with protective covers~~,~~**,** troughs~~, or caps~~**, or by hooking**.

(2) Employees working above grade or any surface and exposed to protruding reinforcing steel or other similar projections shall be protected against the hazard of impalement. Protection shall be provided by:

(A) The use of guardrails, or

(B) Approved fall protection systems meeting the design requirements of Article 24

(C) Protective covers as specified in subsection (d).

~~(3) The use of caps as impalement protection is prohibited for employees working above grade or any surface.~~

(3) Protective covers shall not be used to protect against impalement where the maximum height of fall exposure exceeds 7-1/2 feet, unless the protective covers meet the requirement of subsection (d)(4)(D).

~~(4)(3) Troughs depicted in Appendix Plate C-25 shall not be used as a substitute for engineered or manufactured protective covers when employees are working at heights greater than 6 feet above grade or other working surface.~~

(d) Protective Cover**~~s~~**, **~~and~~ Troughs** ~~and Caps~~ **Specifications, Testing and Approval**.

(1) Protective covers shall be made of wood, plastic, or other **~~similar~~** material**s of equal or greater strength**. **~~If protective covers are job-built, they shall be designed as specified by an engineer currently registered in the State of California. A copy of the engineering drawing(s) depicting the job-built protective covers shall be kept at the worksite and made available to the Division upon request.~~** ~~Caps shall not be job-built.~~

(2) Protective covers**~~, except for troughs as depicted in Appendix Plate C-25, shall, at the minimum, be capable of withstanding the impact of a 250 pound weight dropped from a height of 10 feet without penetration failure of the cover. Protective covers~~** shall have a minimum 4-inch by 4-inch square surface area**, or if round, a minimum diameter of 4-½ inches**.

~~NOTE: This requirement is intended to prevent penetration failure of protective covers impacted at heights up to 7-½ feet. Test specifications should be modified when impacts are anticipated from heights greater than 7-½ feet.~~

(3) Manufactured protective covers shall meet the following requirements:

(A) Manufactured protective covers shall be approved as provided for in Section 1505 and be legibly marked with the manufacturer's name or logo.

(B) Manufactured protective covers made before October 1, 2000 shall, at the minimum, be capable of withstanding the impact of a 250-pound weight dropped from a height of 10 feet without penetration failure of the cover.

(C) Manufactured protective covers made on or after October 1, 2000 shall meet the testing requirements of Section 344.90.

(4) Job-built protective covers shall meet the following requirements:

(A) Job-built protective covers shall be designed as specified by an engineer currently registered in the State of California. A copy of the engineering drawing(s) depicting the job-built protective covers shall be kept at the worksite and made available to the Division upon request.

EXCEPTION: Job-built troughs as depicted in Appendix Plate C-25 may be used as a substitute for engineered or manufactured protective covers when employees a at heights not greater than 6 feet above grade or other working surface.

~~(3)~~(B) Job-built wood protective covers and troughs shall be constructed of at least "Standard Grade" Douglas Fir, as graded by either the Western Lumber Grading Rules ~~91~~ 98, handbook, effective ~~September~~ March 1, ~~1991~~ 1998, published by the Western Wood Products Association, or the Standard No. 17 Grading Rules for West Coast Lumber, handbook, effective September 1, 1991 and revised January 1, 2000, published by the West Coast Lumber Inspection Bureau, which ~~is~~ are hereby incorporated by reference.

PROPOSED STATE STANDARD,
TITLE 8, CHAPTER 4

~~(4) Caps shall be made of rigid molded plastic or similar material and be the proper size for the reinforcing steel being covered.~~

~~(5)~~**~~(4) Manufactured protective covers~~** and caps **~~made prior to October 1, 2000 shall be approved as provided for in Section 1505 and be legibly marked with the manufacturer's name or logo. Manufactured protective covers made on or after October 1, 2000 shall meet the requirements of Section 344.90.~~**

(C) Job-built protective covers, except for troughs as depicted in Appendix Plate C-25, shall, at the minimum, be capable of withstanding the impact of a 250-pound weight dropped from a height of 10 feet without penetration failure of the cover.

NOTE: The drop test requirement in subsection (d)(4)(C) is intended to prevent penetration failure of job-built protective covers impacted at heights up to 7-½ feet.

(D) Drop test specifications for job-built protective covers listed in subsection (d)(4)(C) shall be modified where fall heights greater than 7-½ feet are anticipated, to ensure that the protective cover can withstand increased impact loading.

(e) **Fall Protection.**

Employees shall not be permitted to place or tie reinforcing steel in walls, piers, columns, etc., more than 6 feet above an adjacent surface, unless a personal fall protection system is used in accordance with Section 1670 or other method affording equivalent protection from the hazard of falls from elevated surfaces.

EXCEPTION: Point-to-point horizontal or vertical travel on reinforcing steel up to 24 feet above the surface, provided there are no impalement hazards.

(f) **Securing Reinforcing Steel.**

(1) Reinforcing steel for walls, piers, columns, and similar vertical structures shall be guyed and supported to prevent collapse.

(A) Guys, supports, and braces shall be installed and removed as directed by a qualified person.

~~(g)~~**(2)** Wire mesh rolls shall be secured to prevent dangerous recoiling action.

NOTE: Authority cited: Section 142.3, Labor Code. Reference: Section 142.3, Labor Code.

PROPOSED MODIFICATIONS FOR 2ND 15-DAY NOTICE
(Modifications are indicated by bold, italics and double-underlined for new language and bold, italics, strikeout for deleted language.)

(Only modified pages are included.)

STANDARDS PRESENTATION
TO
CALIFORNIA OCCUPATIONAL SAFETY AND HEALTH STANDARDS BOARD

PROPOSED STATE STANDARD,
TITLE 8, CHAPTER 4

Amend Section 1712 to read as follows:

§1712. ~~Hazards Associated with the Use of~~ Reinforcing Steel and Other Similar Projections.

(a) Scope. This section applies to all work sites and locations where employees work around or over exposed, projecting, reinforcing steel or other similar projections.

(b) Definitions.

~~Caps. Manufactured devices that completely cover exposed ends of reinforcing steel and have flat or mushroomed surface at least twice the diameter of the reinforcing steel they are designed to cover.~~

~~Hooking. Vertical reinforcing steel bent over to an angle of 90 degrees or more, sufficient to prevent impalement.~~

Job-Built. As used in this section, protective covers and troughs usually constructed at the job-site of wood or other ~~similar~~ materials **of equal or greater strength** and designed specifically for covering exposed ends of reinforcing steel or other similar projections at a specific job-site.

Protective Covers. Manufactured or job-built apparatus designed to cover exposed ends of reinforcing steel or other similar projections so as to prevent impalement.

Troughs. Manufactured or job-built protective covers designed to cover **two or more** exposed ends of reinforcing steel or other similar projections so as to prevent impalement**, and which meet the applicable requirements in subsection (d)**. ~~Troughs are long narrow open receptacles, usually boxlike in shape. See Appendix Plate C-25 for an example of a job-built trough.~~

(c) Protection from Reinforcing Steel and Other Similar Projections.

(1) Employees working at grade or at the same surface as exposed protruding reinforcing steel or other similar projections, shall be protected against the hazard of impalement by guarding ~~the~~ **all** exposed ends **that extend up to 6 feet above grade or other work surface,** with protective covers~~,~~ ***or*** troughs~~, or caps~~***~~, or by hooking~~***.

(2) Employees working above grade or any surface and exposed to protruding reinforcing steel or other similar projections shall be protected against the hazard of impalement. Protection shall be provided by:

(A) The use of guardrails, or

(B) Approved fall protection systems meeting the design requirements of Article 24, or

(C) Protective covers as specified in subsection (d).

~~(3) The use of caps as impalement protection is prohibited for employees working above grade or any surface.~~

(3) Protective covers shall not be used to protect against impalement where the maximum height of fall exposure*, to the top of the protective cover,* exceeds 7-1/2 feet, unless the protective covers meet the requirement of subsection (d)(4)(D).

SUMMARY AND RESPONSE TO COMMENTS

SUMMARY AND RESPONSE TO WRITTEN COMMENTS

I. Written Comments:

Lance Murray, Safety Manager, Lusardi Construction Company, by letter dated September 26, 2003.

Comment:

Mr. Murray stated that while the focus of the standard is impalement protection, the standard does not differentiate between vertical and horizontal rebar, nor at what degree angle rebar should be "hooked" to afford maximum impalement protection. Moreover, the standard does not address at what length rebar or other similar projections need to be covered, e.g., "hold down bolts" on residential construction projects where a bolt may extend two to three inches up from the concrete.

Response:

With regard to Mr. Murray's comment pertaining to "hooking," please see the Board's response to Mr. Willwerth's comment letter below.

In response to Mr. Murray's comment regarding at what length rebar or similar projections need to be covered, i.e., what constitutes an impalement hazard, the Board believes this comment is outside the scope of the proposed modifications. However, the Board believes that in accordance with the proposal, the length at which rebar or similar projections would need to be covered is determined by whether or not the projection constitutes an impalement hazard. The Board recognizes that the regulation cannot possibly identify each and every worksite impalement hazard and, being a performance-based standard, gives discretion to the employer to make this determination. The Board also notes that employers needing assistance in making this determination can contact Cal/OSHA Consultation Services.

The Board thanks Mr. Murray for his comments and participation in the rulemaking process.

John Willwerth, Safety Director, J. L. Davidson Company, Inc., by letter dated October 9, 2003.

Comment:

Mr. Willwerth recommended changing the title of Section 1712 to read "Impalement Hazards" in order to eliminate the perception that the requirements in Section 1712 are limited to reinforcement steel.

As a result of drop tests performed on hooked rebar ends, Mr. Willwerth expressed concern regarding the method of hooking as defined in the first modifications of the proposal, and recommended that hooking not be included in Section 1712 as effective protection from impalement until specifications can be added to the definition of hooking that, when applied, would be sufficient to prevent impalement. Mr. Willwerth included a video of the drop tests which showed the effects when a 200-pound sand bag was dropped from 7 ½ feet for "at grade" protection and from 10 feet for "above grade" protection. The tests were performed on various

impalement-potential projections, including steel grade/form stakes, anchor bolts, hooked rebar and EMT conduit, all of which clearly caused the bag to be impaled.

Mr. Willwerth also asked for clarification regarding subsection (c)(3) and whether the prescribed fall height of 7 ½ feet was from the elevated work surface to the cover.
Lastly, Mr. Willwerth recommended adding the phrase "or any employee who may be exposed to the job-built protective cover, upon request" to subsection (d)(4)(A), which pertains to a copy of the engineering drawings depicting the job-built protective covers being kept at the worksite and being made available to the Division upon request.

Response:

Mr. Willwerth's recommendation to change the title of Section 1712 to "Impalement Hazards" is outside the scope of the proposed modifications. The Board notes, however, that the proposed title of the section is consistent with the format of Title 8 sections surrounding Section 1712.

Board staff has reviewed the video submitted by Mr. Willwerth, which has been included as a material relied upon and has been made part of the rulemaking file, demonstrating drop tests on hooked rebar and has reconsidered whether or not sufficient testing and documentation has been conducted to support hooking as an alternative to a protective cover. Though the testing protocol shown in the video appears to be consistent with that specified in Title 8, Section 344.90(e), it remains unsubstantiated. Nevertheless, the video demonstrates failure of the hooked rebar to prevent impalement. The Board therefore concurs with Mr. Willwerth's recommendation to remove "hooking" from the proposal (both the practice and definition) until such evidence is provided to prove otherwise.

The Board also agrees to clarify subsection (c)(3) regarding the 7 ½-foot fall height by specifying "to the top of the protective cover".

And, with regard to Mr. Willwerth's recommendation to add the phrase "or any employee who may be exposed to the job-built protective cover, upon request" to subsection (d)(4)(A), the Board notes that this comment is outside the scope of the proposed modifications. The Board would like to point out, however, that, as specified in the text, these job-built protective covers are required to be designed as specified by an engineer currently registered in the State of California, and a copy of the design is to be kept at the jobsite.

The Board thanks Mr. Willwerth for his comments and participation in the rulemaking process.